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Internet gaming disorder in Lebanon: Relationships with age, sleep habits, and academic achievement

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Background and aims: The latest (fifth) edition of the *Diagnostic and Statistical Manual of Mental Disorders* included Internet gaming disorder (IGD) as a disorder that needs further research among different general populations. In line with this recommendation, the primary objective of this was to explore the relationships between IGD, sleep habits, and academic achievement in Lebanese adolescents. *Methods:* Lebanese high-school students ($N = 524$, 47.9% males) participated in a paper survey that included the Internet Gaming Disorder Test and demographic information. The sample's mean average age was 16.2 years ($SD = 1.0$). *Results:* The pooled prevalence of IGD was 9.2% in the sample. A hierarchical multiple regression analysis demonstrated that IGD was associated with being younger, lesser sleep, and lower academic achievement. While more casual online gamers also played offline, all the gamers with IGD reported playing online only. Those with IGD slept significantly less hours per night (5 hr) compared with casual online gamers (7 hr). The school grade average of gamers with IGD was the lowest among all groups of gamers, and below the passing school grade average. *Conclusions:* These findings shed light on sleep disturbances and poor academic achievement in relation to Lebanese adolescents identified with IGD. Students who are not performing well at schools should be monitored for their IGD when assessing the different factors behind their low academic performance.

Keywords: Internet gaming disorder, academic performance, sleep, video game addiction, gaming addiction, adolescents

INTRODUCTION

Since the early 2000s, there has been a significant increase in the number of studies providing empirical evidence of the existence of problematic gaming and gaming addiction (Kuss & Griffiths, 2012). Due to this, the latest (fifth) edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) included Internet gaming disorder (IGD) in Section III and stated that IGD is a condition that requires further study before being included in the main text (American Psychiatric Association [APA], 2013). With IGD being a new concept, it is still being debated with many issues and concerns raised over, whether it is a genuine disorder or not, and if it is genuine, what criteria are the most suitable for diagnosis (Kuss, Griffiths, & Pontes, 2017a, 2017b).

Despite the availability of several IGD assessment tools (Lopez-Fernandez, Honrubia-Serrano, Baguley, & Griffiths, 2014; Pápay et al., 2013; Sanders & Williams, 2016; Wu, Lai, Yu, Lau, & Lei, 2016), research results collectively indicated that the IGD is a global phenomenon (Ko, 2014; Müller et al., 2015; Wittek et al., 2015) with pooled prevalence ranging from 1.2% (Rehbein, Kliem, Baier, Mößle, & Petry, 2015) to 7.6% (Festl, Scharkow, & Quandt, 2013) in nationally representative samples. Research also appears to indicate that the highest prevalence rates of IGD are found among older adolescents and emerging adults. For instance, in Germany, an IGD prevalence rate of 1.2% was observed in a representative sample of 11,003 young to older adolescents ranging in age from 13 to 18 years using the Video Game Dependency Scale (CSAS-II; Rehbein et al., 2015). A study that included seven European countries reported a prevalence rate of 5.3% in a sample of 12,938 adult gamers using the Assessment of Internet and Computer Game Addiction – Gaming Module (AICA-S-gaming) (Müller et al., 2015). In Slovenia, an IGD prevalence rate of 2.5% was obtained in a sample of 1,071 gamers aged 13–14 years old using the Internet Gaming Disorder Scale – Short-Form (IGDS9-SF; Pontes, Macur, & Griffiths, 2016). The Game Addiction Scale (Lemmens, Valkenburg, & Peter, 2009) was used in European countries reporting an IGD prevalence rate of 1.4% in a Norwegian representative sample of 3,035 adult gamers (16–71 years old) (Wittek et al., 2015) and a rate of 7.6% of problematic users of ages below 19 years in a German representative sample of 580 adolescent gamers (Festl et al., 2013). In the Netherlands, in a nationally representative study of

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4,559 adolescent gamers aged 13–16 years, a prevalence rate of 1.5% was reported using the Compulsive Internet Use Scale (Van Rooij, Schoenmakers, Vermulst, Van Den Eijnden, & Van De Mheen, 2011). Table 1 includes these and other selected epidemiological studies that have investigated IGD.

In addition to prevalence, researchers have been interested in identifying trends and negative impact of IGD (Kim et al., 2016; Müller et al., 2015) including academic achievement, time spent gaming, money spent on gaming, sleep duration, and impact on job/education and other leisure activities. A number of studies have demonstrated the negative impact of gaming on academic achievement (Van Rooij et al., 2011). For instance, a longitudinal study of 482 American adolescents with average age of 12 years reported that video game playing was associated with lower grade point averages (GPAs; Jackson, Von Eye, Witt, Zhao, & Fitzgerald, 2011). Recent studies have confirmed this finding from many parts of the world including Germany (Rehbein et al., 2015), Taiwan (Yeh & Cheng, 2016), Lebanon (Hawi & Samaha, 2016), Norway (Brunborg, Mentzoni, & Frøyland, 2014), Iran (Haghbin, Shaterian, Hosseinzadeh, & Griffiths, 2013), and the United States of America (USA) (Schmitt & Livingston, 2015; Wentworth & Middleton, 2014).

As for time spent gaming, a study conducted in Hong Kong on a sample of 503 adolescents showed that of total gamers, 22.9% and 36.6% played more than 3 hr on weekdays and weekends, respectively, and 31.2% and 32% played more than 1 hr on weekdays and weekends, respectively (Wang et al., 2014). Studies also report that gamers tend to play online games rather than offline. For instance, the

Table 1. International comparison of prevalence rates of video game addiction/Internet gaming disorder

Reference	Scale used	Sample size	Age	Prevalence rate (%)	Country	Nationally representative sample
Pontes, Macur, and Griffiths (2016)	Internet Gaming Disorder Scale – Short-Form (IGDS9-SF)	1,071	$M = 13$	2.5	Slovenia	Yes
Fuster et al. (2016)	Spanish version IGD-20 Test	1,074	12–58	2.6	Spain	No
Pontes and Griffiths (2016)	IGDS9-SF	509	10–18	Not available	Portugal	No
Khazaal et al. (2016)	7-item Game Addiction Scale (GAS)	5,983	$M = 20$	2.3	Switzerland	No
Kim et al. (2016)	The suggested wordings of the DSM-5 criteria was applied	3,041	20–49	13.8	Korea	No
Rehbein et al. (2016)	Gaming usage and time questions	3,073	$M = 49$	4.2	Germany	Yes
Lemos, Cardoso, and Sougey (2016)	Video Game Addiction Test (VAT)	384	18–24	Not available	Brazil	No
Rehbein et al. (2015)	CSAS-II	11,003	13–18	1.16	Germany	Yes
Wittek et al. (2015)	7-item Game Addiction Scale for Adolescents (GAS)	3,035	16–74	1.4	Norway	Yes
Müller et al. (2015)	Assessment of Internet and Computer game Addiction–Gaming Module (AICA-S-gaming)	12,938	14–17	1.6	7 European countries	Yes
Pontes et al. (2014)	Internet Gaming Disorder Test (IGD20-Test)	1,003	16–58	5.3	57 countries	No
Lopez-Fernandez et al. (2014)	Problematic Videogame Playing Scale	1,132 1,224	11–18	7.7 14.6	Spain Great Britain	No
King, Delfabbro, Zwaans, and Kaptsis (2013)	Pathological Video Gaming (PVG)	1,287	12–18	1.8	Australia	No
Spekman, Konijn, Roelofsma, and Griffiths (2013)	Problematic gaming behavior	1,004	11–18	8.57	Netherlands	No
Festl et al. (2013)	7-item Game Addiction Scale for Adolescents (GAS)	580	14–18	7.6	Germany	Yes
Brunborg et al. (2013)	Game Addiction Scale for Adolescents (GASA)	1,320	$M = 13.6$	4.2	Norway	Yes
Van Rooij et al. (2011)	Compulsive Internet Use Scale (CIUS)	4,559	13–16	1.5	Netherlands	Yes
Choo et al. (2010)	Pathological Video Gaming Scale	2,998	$M = 11.2$	8.7	Singapore	No
Grüsser, Thalemann, and Griffiths (2007)	Adapted from WHO criteria for substance dependence	7,069	21.1	11.9	Germany	No
Johansson and Götestam (2004)	Internet Addiction Test	3,237	12–18	2.7	Norway	Yes

aforementioned Hong Kong study reported that (a) playing online multiplayer games was the most preferred type of game, (b) online single player games ranked second, and (c) a minority preferred playing offline casual games (Wang et al., 2014). Online gaming can result in extended periods of gaming for which a small minority can be problematic and addictive. In addition, evidence suggests that some game genres are more addictive than others, such as role-playing games and first-person shooter games (Festl et al., 2013; Lemmens & Hendriks, 2016; Na et al., 2017; Rehbein, Staudt, Hanslmaier, & Kliem, 2016; Sanders & Williams, 2016).

Excessive online gaming has also been shown to reduce gamers' sleep duration and/or result in deteriorating sleep quality (Demirci, Akgönül, & Akpinar, 2015; Rehbein et al., 2015), especially in adolescents (Achab et al., 2011; Arora, Broglia, Thomas, & Taheri, 2014; Lam, 2014). A recent study reported that 28% of participants with sleep problems have IGD (Satghare et al., 2016). The authors' follow-up of some gamers suggest that they stay awake longer than the recommended sleep guidelines or awake early from sleep to continue playing either to advance to the next level in the game, to simply sustain the current game level, and/or for pleasure. Furthermore, some studies have reported that gamers spend varying amounts of money to purchase additional lives, cheats, virtual weapons, gadgets, and/or accessories to gain advantage or just for the fun of game playing (Cleghorn & Griffiths, 2015). In the sample of the aforementioned Hong Kong study, around 40% reported having spent money on gaming, of which 3.6% spent above US $65, and 9.9% spent between US $25 and $64, monthly (Wang et al., 2014). In addition, it has also been noted in many studies that gender (being male) and age (being younger) correlate with the IGD (Hawi & Rupert, 2015; Hawi & Samaha, 2017a, 2017b; Rehbein et al., 2016; Samaha & Hawi, 2017; Wittek et al., 2015).

The aim of this study was to explore the extent to which age, sleep habits, and academic achievement explain a statistically significant amount of variance in IGD among high-school adolescents (Griffiths, 2014) in a population that has never been previously studied (i.e., Lebanese teenagers). Another aim was to determine the prevalence of IGD in the study's Lebanese sample and identify variables associated with IGD to contribute to knowledge in this field of study as recommended by DSM-5 (APA, 2013). Despite the influence of external factors, such as the Lebanese culture and political environment, a better understanding of the predictors of IGD in different cultures is another step toward helping those who provide treatment and rehabilitation for those with clinically significant impairment (Griffiths, 2014; Petry & O'Brien, 2013).

METHODS

Participants and procedure

The present investigation was a cross-sectional study carried out in 2016 at 10 Lebanese high schools based on voluntary participation of students. A total of 2,096 students from grades 10, 11, and 12 (aged 15–19 years) received the questionnaire (mean age = 16.2 years, $SD = 1.0$). Participation in the survey was purely voluntary and the overall response rate was 25%, yielding an adequate sample size (524 participants). There was a lower ratio of male (47.9%) to female respondents. Participants were recruited from 10 schools operating in different administrative governorates across Lebanon. Schools where English was a medium of instruction were targeted (because the survey was in English). Following the school's approval to collect the data, the "pen and paper" survey was administered in classrooms in the presence of class instructors.

Measures

The survey questionnaire was self-report, in English, and handed out on paper copy. It included two sections. The first section collected demographic information, including participant's age, gender, grade average, starting age of Internet gaming, amount of time spent gaming online and offline on weekdays and weekends, typical sleep duration and whether the individual woke up during the night to continue gaming, and money spent on Internet gaming.

The second section included the Internet Gaming Disorder Test (IGD-20 Test; Pontes, Kiraly, Demetrovics, & Griffiths, 2014). This scale reflects the nine criteria of IGD as stated in the DSM-5 and incorporates the theoretical framework of the components model of addiction (Griffiths, 2005). It is a validated and well-established scale that has been used in many studies and translated to Spanish, Portuguese, and Arabic (Fuster, Carbonell, Pontes, & Griffiths, 2016; Hawi & Samaha, 2017c; Pontes & Griffiths, 2016). Participants rated the 20 items on a 5-point Likert scale: 1 ("strongly disagree"), 2 ("disagree"), 3 ("neither agree nor disagree"), 4 ("agree"), and 5 ("strongly agree"). In the process of validating IGD assessment scales and particularly the assessment of criterion-related validity, the association between scale score and time spent gaming time was analyzed (Donati, Chiesi, Ammannato, & Primi, 2015; Festl et al., 2013). In the study conducted by Pontes, Kiraly, Demetrovics, and Griffiths (2014), which included 57 countries, the IGD-20 Test scores positively and strongly correlated with weekly gameplay time ($r = .77$, $p < .001$). A similar result was recently obtained in Spain ($r = .42$, $p < .01$) (Fuster et al., 2016) and Portugal ($r = .36$, $p < .01$) (Pontes & Griffiths, 2016). In this study, the IGD-20 Test scores positively and strongly correlated with weekly gameplay ($r = .58$, $p < .001$). In addition, in this study, the IGD-20 Test demonstrated excellent internal consistency (Cronbach's $\alpha = .915$).

Analysis

Data analyses were performed using SPSS 20.0 (SPSS, version 20.0 Chicago, IL, USA). The major aim of this research was analyzed using hierarchical multiple regression. Prior to regression analyses, preliminary analyses were first conducted to ensure that there was no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. No violations were found. In addition to regression analysis, descriptive statistics and Pearson product moment correlations were carried out.

Ethics

Following the approval of the Research Ethics Committee at Notre Dame University, Louaize, the research study was conducted including the distribution of the survey questionnaire to schools. After receiving written informed parental consent, students were allowed to fill the questionnaires on a voluntary basis.

RESULTS

The sample's mean average age was 16.2 years ($SD = 1.0$). The average number of years that participants reported online gaming was 7.75 years ($SD = 2.9$). Participants were classed into three groups. The following notations are used to distinguish between the three different groups studied: Internet Gaming Disorder Group (IGDG; scoring 71 or more on the IGD-20), at-risk of IGDG (RIGDG; scoring between 50 and 70 on the IGD-20), and casual gaming group (CGG; scoring below 50 on the IGD-20) representing those who did not meet IGD criteria.

Prevalence and patterns in Internet gaming

A total of 98.0% of participants used more than one platform for online gaming, and 61.3% used three or more platforms. As assessed by the IGD-20 Test, 9.2% of respondents belonged to the IGDG, 35.7% to the RIGDG, and 55.1% to the CGG. The average daily playtime of gamers in this study was 2.2 hr/day. It is noteworthy that the average gaming time spent online doubled on weekends compared to weekdays within all three groups. In addition, the maximum number of hours gaming online increased from 7 hr/day on weekdays to 14 hr/day on weekends. Among groups, the average time spent gaming online on weekdays increased from 1.7 hr/day within the CGG to 2.5 hr/day within the RIGDG to 3.6 hr/day within the IGDG. In addition, the average time spent gaming online at weekends followed a similar pattern (Table 2). Furthermore, results showed that the percentages of respondents, in both the IGDG and the RIGDG, within grades 10, 11, and 12, were 50.0%, 34.1%, and 15.9%, respectively. The higher the grade level, the lower the percentage of participants with IGD.

Table 2. Prevalence and trends of predictors of IGD in Lebanese high-school students ($N = 524$)

	IGDG	RIGDG	CGG	Total
		%		
Prevalence	9.2	35.7	55.1	100
		Hours/day		
Average Internet gaming playtime				
Weekdays (*SD*)	3.6 (1.9)	2.5 (1.4)	1.7 (1.2)	2.2 (1.4)
Weekends (*SD*)	8.1 (3.8)	5.9 (3.5)	3.4 (2.1)	4.7 (3.3)
		%		
Offline versus online Internet gaming playtime (within group)				
Offline	11.1	42.9	53.7	45.9
Online	88.9	45.7	38.9	45.9
Both	0.0	11.4	7.4	8.2
		Hours/night		
Sleep duration (*SD*)	4.9 (2.7)	6.9 (1.6)	7.1 (1.5)	6.9 (1.7)
		%		
Sleep disturbance (within group)				
Sometimes	100.0	42.9	13.0	31.6
Never	0.0	57.1	87.0	68.4
		$		
Monthly spending on Internet gaming				
Average (*SD*)	74.4 (110.3)	20.25 (25.9)	12.4 (40.1)	21.9 (51.5)
Range	0–350	0–100	0–250	0–350
		Grade point average out of 20		
Academic achievement				
Average (*SD*)	10.5 (3.1)	12.1 (3.2)	13.4 (2.8)	12.7 (3.1)
		%		
Platforms of Internet gaming (within group)				
Mobile phones	88.9	97.1	87.0	90.8
Computers	55.6	71.4	63.0	65.3
Game consoles	55.6	65.7	66.7	65.3
Tablets	33.3	68.6	64.8	63.3

Note. SD: standard deviation; IGDG: group of participants identified with Internet gaming disorder; RIGDG: group of participants identified at-risk of Internet gaming disorder; CGG: Group of participants identified as casual players.

The average time spent online gaming of the CGG increased from 1.7 hr/day on weekdays to 3.4 hr/day on weekends. The average time spent online gaming at weekends of the CGG (3.4 hr/day) matched that of IGDG on weekdays (3.4 hr/day). At first glance, it is tempting to conclude that some CGG gamers on weekends should be classified as IGDG. However, the time spent online gaming was not strongly correlated with IGD, otherwise participants from the CGG who played as much as IGDG would have been identified with IGD using the IGD-20 Test. CGG participants who doubled their time spent online gaming at weekends did so for entertainment purposes and not controlled by disorder criteria as it is the case with the IGDG.

Table 2 shows a clear change in the pattern of offline and online usage. More gamers within the CGG played offline, whereas gamers in the RIGDG played online rather than offline. Eight times as many gamers in the IGDG played online rather than offline, and none in the IGDG played offline games at all. With regard to sleep duration, the average number of hours of sleep per night was 7.1 hr within the CGG and 4.9 hr within the IGDG. The results also found that 13.0% of the CGG gamers woke up from their sleep during the night to continue gaming compared with 42.9% of the RIGDG gamers and 100.0% of the IGDG. In addition, the average monthly spending on Internet gaming rose from US $12.40 within the CGG to US $20.25 within the RIGDG, and to US $74.40 within the IGDG. GPA (of over 20) went down to 13.4 within the CGG, to 12.1 within the RIGDG, and to 10.5 within the IGDG (Table 2).

Relationship between IGD, gender, age, sleep habits, and academic achievement

The sample size was adequate for hierarchical regression analysis as only five independent variables were investigated (Tabachnick, Fidell, & Osterlind, 2001). None of the independent variables correlated, except for a weak association between gender and sleep disturbance. The collinearity statistics tolerance and variance inflation factor (VIF) were within accepted limits indicating that there was no multicollinearity among factors. More specifically, tolerance values ranged between 0.90 and 0.96, and VIF values ranged between 1.0 and 1.1 (much below the threshold 3). Consequently, the assumption of multicollinearity was met (Coakes, 2005). In addition, the Mahalanobis distance scores indicated that there were no multivariate outliers. Moreover, residual and scatter plots indicated that the assumptions of normality, linearity, and homoscedasticity were all met (Hair, Black, Babin, Anderson, & Tatham, 1998). Following this, a four-stage hierarchical multiple regression was carried out to assess the extent to which gender, age, sleep duration, sleep disturbance, and academic achievement predicted levels of IGD among the participants (as assessed using the IGD-20). Gender was entered at step 1 of the regression, age was entered at step 2, sleep duration and sleep disturbances at step 3, and academic achievement at step 4. The regression analysis results are reported in Table 3. The hierarchical multiple regression demonstrated that at step 1, gender was not a significant contributor to the regression model, although it accounted for 3.5% of the variation in IGD (Table 3). Introducing age explained an additional 16.5% of the variation in IGD, and this change in R^2 was significant [$F(1, 522) = 6.201$, $p < .05$]. Adding sleep duration and sleep disturbance to the regression model explained an additional 23.3% of the variation in IGD and this change in R^2 was also significant [$F(3, 520) = 10.816$, $p < .001$]. Finally, the addition of academic achievement to the regression model explained an additional 9.0% of the variation in IGD and this change in R^2 was again significant [$F(4, 514) = 12.804$, $p < .001$]. In sum, four predictors (age, sleep duration, sleep disturbance, and academic achievement) together accounted for an additional 48.8% of the variance in IGD after controlling for gender. The beta values for sleep-related measures were higher than age and academic achievement, with sleep disturbance having the greatest influence on IGD (Table 3). Results demonstrated that the risk of IGD in adolescence was increased by being younger, having lower academic achievement, having lower sleep duration, and waking up more during the night to continue gaming.

Table 3. Hierarchical multiple regression of predictors of Internet Gaming Disorder in Lebanese high-school students ($N = 524$)

Predictor variables	β	*t*	*R*	R^2	R^2	Δ*F*
Step 1			.035	.001	−.005	0.199
Gender	−0.035	−0.446				
Step 2			.200	.040	.040	6.201*
Gender	−0.025	−0.310				
Age	−0.199	−2.490*				
Step 3			.433	.187	.187	10.816***
Gender	0.020	0.245				
Age	−0.244	−3.032**				
Sleep duration	−0.212	−2.766**				
Sleep disturbance	0.346	4.376***				
Step 4			.523	.274	.274	12.804***
Gender	0.101	1.330				
Age	−0.218	−2.850**				
Sleep duration	−0.212	−2.766**				
Sleep disturbance	0.346	4.376***				
Academic achievement	−0.183	−2.455*				

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

DISCUSSION

This study examined the relationships between IGD and other variables (age, sleep-related factors, and academic achievement) among Lebanese adolescents. The results showed that 9.2% of the study's sample were classed as having IGD using the IGD-20 Test. The prevalence of IGD in this study is above midrange among those reported in other studies (Table 1), with a range between 1.2% in Germany (Rehbein et al., 2015) and a 14.6% in the United Kingdom (Lopez-Fernandez et al., 2014). One possible reason for the high prevalence rate of IGD may have been due to the age of the sample, because IGD appears to be more prevalent among older adolescents and emerging adults (Griffiths, Kuss, & Pontes, 2016). This variance in studies' results may also be explained by one or more of the following: (a) use of different scales to assess the IGD (Griffiths, 2014; Kim et al., 2016; Király, Nagygyörgy, Griffiths, & Demetrovics, 2014; Schmitt & Livingston, 2015); (b) use of same scale, but using different cut-off thresholds (Rehbein et al., 2015); (c) employment of different sampling procedures (Sanders & Williams, 2016); (d) selection of samples differing in their characteristics (Rehbein et al., 2015; Sanders & Williams, 2016; Wentworth & Middleton, 2014); and/or (e) collection of data at different times of the year (Griffiths, 2014; Kim et al., 2016).

Similar to many studies, the study's sample included more gamers classed as at-risk of IGD (RIGD) (35.7%) than gamers classed with IGD (9.2%) (Müller et al., 2015; Wittek et al., 2015). While the average daily playtime of gamers in this study (2.2 hr/day) was very close to that of a Portuguese sample (Pontes & Griffiths, 2016), it was lower than that of a Singaporean sample (2.9 hr/day) (Choo et al., 2010), but higher than that of a German sample (1.6 hr/day) (Rehbein et al., 2015). The IGDG's average daily playtime (8.1 hr/day) was much higher than that of a German sample (6.3 hr/day) (Rehbein et al., 2015). Similar to this study, an investigation conducted on a South Korean sample reported that the those with IGD spent more hours a week gaming compared with all the rest (Kim et al., 2016) and the average time spent gaming doubled at weekends for all subgroups within the sample (Hawi, 2012). It is worth noting that this study was conducted in May, which was toward the end of the school year, with a noticeable increase of homework and exams. It was anticipated that the amount of time spent gaming would be much higher during holidays and summer vacation. As the data were collected during school days, the only period for participants to carry out their gaming was before and after school. In addition, massively multiplayer games involves gamers from different time zones to keep building their characters, which can lead to sleep deprivation (Achab et al., 2011) with some gamers who avoid logging off and become preoccupied with minimizing possible losses. Probably for the aforementioned reasons, all gamers assessed with IGD reported that sometimes they woke up during the night to continue gaming online (Rehbein et al., 2015). This result confirms previous studies that reported gaming addicts refrain from sleeping to gain more time in the virtual world (Bartel & Gradisar, 2017; Lam, 2014; Satghare et al., 2016; Young, 2009).

In this study, the school GPA of the IGD group (Table 2) was below the passing grade and much lower than the GPAs of those RIGD and the CGG. Other studies have reported that participants with IGD had poorer academic achievement in Singapore (Choo et al., 2010), USA (Jackson et al., 2011), Norway (Brunborg et al., 2014), and Germany (Rehbein et al., 2015). This finding is likely explained by the large amount of time spent allocated to gaming (Kuss & Griffiths, 2012) especially during study days, which in turn may lead to lack of in-class concentration due to sleep deprivation (Ko, 2014). This study found that 92.3% of participants with IGD reported that they are preoccupied with Internet gaming, and of these participants, 75% reported that they wake up during the night to continue gaming. This state of mind, whereby a gamer is either gaming or thinking about gaming all the time, can in some cases lead to neglect of day-to-day responsibilities at school and home. Sleep-deprived participants, whether in quantity or quality, cannot focus on their studies and are therefore unable to learn efficiently. This phenomenon builds upon existing studies showing how academic achievement is negatively affected by different technological addictions (Samaha & Hawi, 2016) and in particular by the excessive gaming (Jackson et al., 2011). Finally, the percentage of gamers who played online in this study's sample (45.9%) was lower than that of a similar Canadian sample (52.8%) (Sanders & Williams, 2016).

Limitations and recommendations

The main limitations of this study were its cross-sectional design, the use of a non-representative sample, the use of Lebanese schoolchildren only, and the use of self-report data. All of these methodological issues have well-known biases (e.g., social desirability bias and recall bias) and shortcomings (e.g., non-generalizability to other samples and cultures). Another limitation is that the IGD-20 Test was developed and validated using a young adult sample and not on older adolescents. The use of a scale developed for adults may have affected the prevalence scores when used by older age adolescents. In future studies, a scale designed specifically for adolescents would be of benefit to overcome this limitation. All studies cited in this paper also used cross-sectional design for its practicality and convenience (as was the case in this study); therefore, longitudinal studies are needed to determine the causal relationships between the different variables, as such associations found in this and other studies can go in both directions. In particular, evidence is needed to determine whether IGD causes low academic achievement or vice versa. It should also be noted that the response rate was low (25%) and this also needs taking into account when considering the results. The low response rate may have been because (a) participation was purely voluntary, and/or (b) the English language skill among students was not sufficient to answer the survey questions. Finally, future research should target adolescents from various cultures preferably different countries and compare results. However, this study adds to the literature, because it is one of the very few to be carried out in Lebanon.

CONCLUSIONS

The DSM-5 introduced IGD as a condition for further study (APA, 2013) and suggested nine criteria for its diagnosis. Using a psychometrically robust scale incorporating these nine criteria, this study provided insight into the field of IGD by examining a sample of Lebanese adolescents in relation to prevalence and potential predictors of IGD. Assessment using the IGD-20 showed that the prevalence of IGD was 9.2% in the study's population sample. Furthermore, the study identified some key predictors of IGD including being a younger adolescent, sleeping less, waking up from sleep more during the night to continue playing, and poor academic achievement. These empirical research findings suggest factors that might guide early detection and prevention of IGD.

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